the bird to push off from the ground while taking off, and buffer the shock while landing.

The healing of such a fracture in human beings would take three months. The exact healing period in a bird (assessed by subsequent X-rays) is not known.

As absolute anatomy had been restored and the fracture subsequently healed well, we expected that the eagle would recover to normal and could be released back in its environment subsequently. The eagle was kept under the care of Neelamkumar Khaire at the Snake Park Office, for three months and fed with mice daily. There after it was released.

This operation was done by me, assisted by Dr. Sunil Jakar, Atul Varekar and Jayant Deshpande.

April 9, 1990 SATTYASHEEL NAIK

8. RUFOUSBELLIED HAWK-EAGLE *HIERAAETUS KIENERII* (E. GEOFFROY) IN ANDHRA PRADESH

The Birdwatchers Society of Andhra Pradesh had organised a camp at Tirumala Hills, Tirupati from 24 to 28 August 1990. During this camp a rufousbellied hawk-eagle *Hieraaetus kienerii* was sighted on the morning of 25 August at Japali, 5 km from the town of Tirumala on the Tirumala-Tirupati road.

The rufousbellied hawk-eagle is about the size of a kite. There is a faint but distinct occipital crest. The head, crest, back, wings and upper tail are dark slaty black. The lower breast, belly and vent are rusty red while the upper breast and throat are white with black streaks. The red plumage also has black streaks mostly on the flanks and thighs. The undertail is silvery white with four faint black bands and one broad black terminal band. The tarsi are clothed in short bristles.

In overhead flight the secondaries and lower body are rusty red, the outer wing feathers (primaries) are black and there is a white band separating the black feathers from the red. The black terminal tail band is very suggestive of its identity as also the white throat and upper breast.

Ali and Ripley (COMPACT HANDBOOK OF BIRDS, 1987) gives the bird's status in south India as "...the Western Ghats strip in South India from Goa and N. Mysore through Kerala (up to *c* 1200 m). Absent in intervening country." Taher and Pittie (CHECKLIST OF THE BIRDS OF ANDHRA PRADESH, 1989) also do not mention this species as occurring in the state. In no other literature can I find reference of this bird as being found in Andhra Pradesh.

This then may result in a range extension of the species particularly if further sightings were to occur from this part or other parts of the state also. The habitat as mentioned in the HANDBOOK seems to tally with that on the Tirumala Hills where the bird was seen.

June 28, 1991 HUMAYUN TAHER

9. SOME OBSERVATIONS ON MAINTENANCE BEHAVIOUR OF THE REDWATTLED LAPWING *VANELLUS INDICUS* (BODDAERT)

(With eleven text-figures)

Introduction

This paper deals with some observations on maintenance behaviour of the redwattled lapwing *Vanellus indicus*. The term 'maintenance behaviour' as used in this paper includes movements associated with preening, bathing, cleaning, shaking, wing drying, stretching, resting and sleeping.

The study was carried out in Chandigarh (30° 42′ N, 76° 54′ E) and surrounding areas. All observations were made on wild birds using 12 x 50 prismatic binoculars and a portable blind (LeCroy 1975). The categorisation of various activities as maintenance behaviour is after Armstrong (1950), Dilger (1960), Mayerriecks (1960), Maxwell and Putnam (1968) and McAllister and Maxwell (1971).

Observations and Discussion

Preening: Preening was the most frequent maintenance activity observed in the redwattled lapwing during interludes between feeding, nest relief, after copulation and periods of resting. All regions of the body accessible to the beak were preened. The preening of breast (Fig.1), wing coverts

(Fig.2), abdominal, back and rump regions was done by nibbling, while primaries, secondaries and rectrices (Fig. 3) were stroked.

For preening the breast and belly regions, the head was turned towards the respective region. Preening of the wing was done from inside as well outside, for which the wing was slightly extended and the head bent backwards. For stroking the rectrices, the neck was turned backwards to one side, head tilted at an angle, tail was spread and turned on its axis to one side. In all preening activities the body was kept horizontal and the tail was not lowered, except during breast preening where the tail was lowered slightly. Horizontal body posture during preening is an adaptation in waders and ducks: lowering of wings or tail, thereby touching the muddy substrate, will lead to wet or dirty feathers and will probably damage the delicate tips of wings and tail (Ten Cate 1985). During the breeding season, copulation was always followed by tail and belly preening in males and tail preening in females. Preening movements in the chicks appeared 2-3 days after hatching. Due to poor coordination, young chicks usualy toppled over when they attempted to preen. Initially only the breast and outer wing regions were preened; preening developed gradually as the chicks grew older.

Preening helps in the care of plumage, removal of ectoparasites, and to rearrange the feathers that might get displaced during various activities. Other reported functions of preening are advertisement (Sodhi and Khera 1984) and courtship display (McKinney 1965, Edwards 1982). Preening as displacement activity has been reported in the breeding avocet *Recurvirostra avosetta,* little ringed plover *Charadrius dubius,* kentish plover *Charadrius alexandrinus* (Simmons 1961), common tern *Sterna hirundo* and sandwich tern *Sterna sandvicensis* (Iersel and Bol 1958).

Bathing: For bathing the redwattled lapwing waded into a shallow pool, sat in water, dipped its head and body alternately into water and performed body shaking movements.The wings were kept slightly elevated during bathing. On a few occasions, the birds were observed to perform breast preening during bathing.

Cleaning: Some cleaning movements observed are as follows: *Scratching*: The bird scratched its head, neck and beak by dropping one wing and bringing up the corresponding leg over to the region to be scratched (Fig. 4). This method of scratching has been termed indirect scratching (Simmons 1957, 1961; McFarland 1981). The head was rotated and turned for scratching different regions of head and beak. The scratching was usually associated with preening but could also be observed as an independent maintenance activity. McKinney (1965) observed that scratching serves to remove irritation caused by ectoparasites, loose feathers and clean. In the redwattled lapwing, scratching also helped to clean the bill. Chicks also scratched by indirect method. Although very young chicks could not bring up their leg over the shoulder for scratching, the wing was always lowered prior to scratching. The head scratching methods in birds have taxonomic significance and one method is used by all members of the same family (Simmons 1957). Simmons (1961) reported head scratching as displacement activity in the breeding avocets and little ringed plovers. The lowering of wing during indirect scratching may serve the bird to keep better balance either by lowering the centre of gravity (Simmons 1961) or by placing the wing bow on the perch as a support for the body (Ten Cate 1985).

Shoulder rubbing: During this activity, the bird turned its neck to one side and vigorously rubbed the lateral side of its head on the outer side of wings near the shoulder region (Fig. 5). The shoulder rubbing was observed as an independent activity as well as in association with preening and bathing. This movement probably served to clean the eye.

Shaking: The following shaking movements were observed: *Body shake:* The bird assumed a horizontal posture, loosened the wings and vigorously shook the body along the antero-posterior axis (Fig. 6). This was followed by one jerky rotating movement of the head. Body shake was observed after preening, bathing and copulation. Body shake helps to remove water drops from the feathers and to rearrange disordered feathers.

Wing shake: The redwattled lapwing withdrew its neck, loosened its wings and shook them with short vibrating motion. The wing shake was usually observed after preening of wings after bathing. This movement helped to dry and rearrange the wing feathers.

Head shake: The head and bill were shaken laterally by movements of the neck. Head shake occurred independently or in association with preening and after feeding. Chicks also performed head shake.

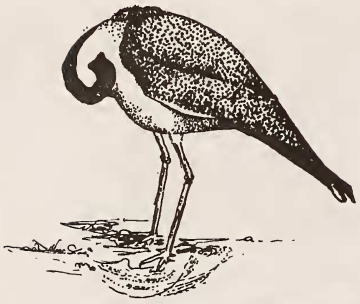

Fig. 1 Preening (Breast)

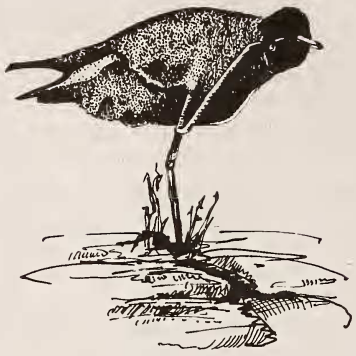

Fig. 4 Scratching

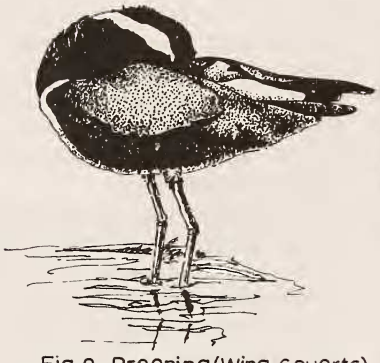

Fig. 2 Preening (Wing coverts)

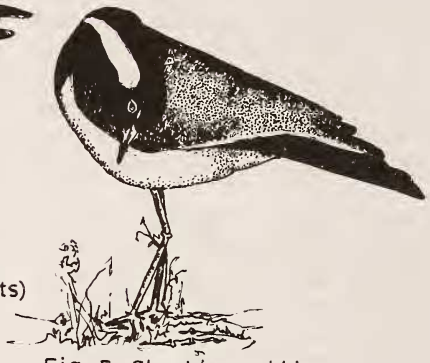

Fig. 5 Shoulder rubbing

Fig. 3 Preening (Rectrices)

Fig. 6 Body shake

Figs. 1-6. Redwattled lapwing, showing postures during preening, resting etc.

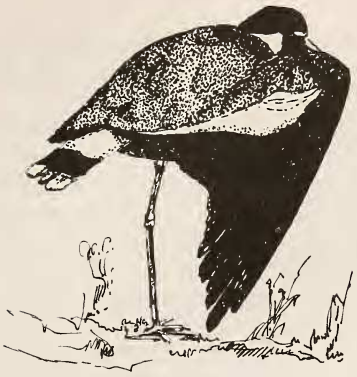

Fig. 7 Wing and leg stretch

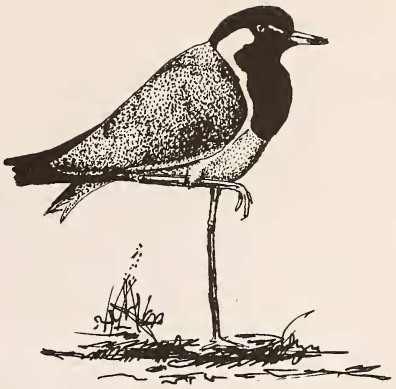

Fig. 9 Resting on one leg

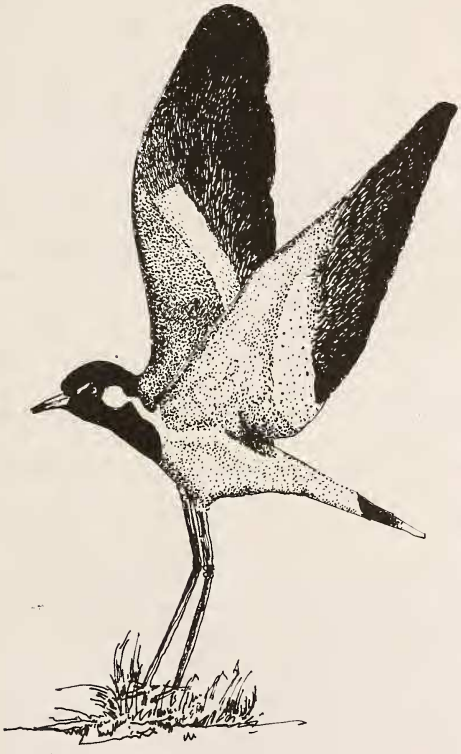

Fig. 8 Both wings stretch

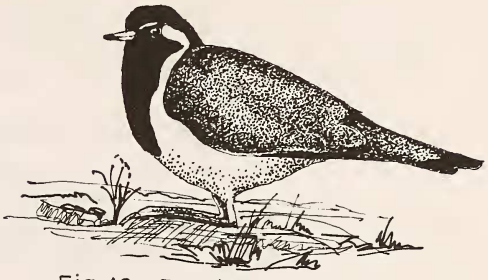

Fig. 10 Resting on tarsi

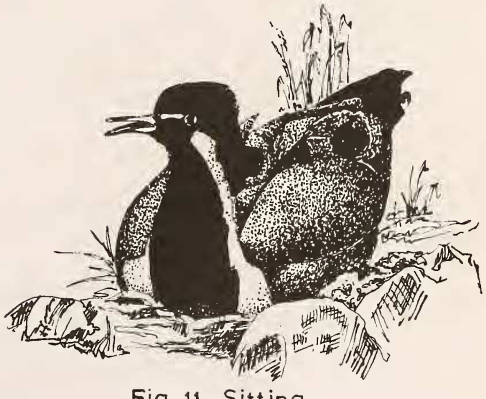

Fig. 11 Sitting

Figs. 7-11. Redwattled lapwing, showing postures during preening, resting etc.

Head shake removes water, dirt, food particles or loose feathers from the surface of bill (McKinney 1965).

Tail wag: In this movement the tail was shaken laterally a number of times. The rectrices were not fanned during this movement. In general tail wag was observed during preening, after copulation, defecation and bathing. McKinney (1965) observed that tail wag in male Anatidae probably helps to return the penis to its usual position in the cloacal cavity after copulation. Other functions of tail wag are – removal of water from the tail, rearrangement of misplaced rectrices and tail coverts and reinversion of cloacal lips after defecation.

Stretching: Wing and leg stretch, and both wings stretch were the two stretching movements observed. *Wing and leg stretch*: In this movement the bird withdrew the neck, shifted its weight on to one leg and extended the wing of the other side backwards (Fig. 7). The leg on the side of stretched wing was then extended beneath the wing. After stretching, the leg and wing were withdrawn simultaneously.

Both wings stretch: The bird while standing raised both wings upwards simultaneously (Fig.8).

Both types of stretching activities were performed after periods of rest. Stretching probably helps to stimulate the flow of blood in the limbs, thus preparing the muscles for further activity (Kortlandt 1940 in McKinney 1965).

Resting and sleeping: In all resting postures the neck was withdrawn. The birds rested while standing on both legs, on one leg (Fig. 9), on tarsi (Fig. 10) and sitting (Fig. 11). In one variant of resting in standing posture, the birds, while keeping the carpal joints bent and near the body, extended their primaries downwards. The primaries in this position never touched the ground. The eyes were closed in all the resting postures. Chicks both rested on tarsi and sitting, but closed their eyes in sitting posture only.

ACKNOWLEDGEMENTS

We thank the Chairman, Department of Zoology, Panjab University, Chandigarh for providing facilities and Jaswinder Saini for help in the field.

R.S. KALSI
April 9, 1991 S. KHERA

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